CLAIMS

We claim:

1. A system for sharing bandwidth among a plurality of internet service providers (ISPs) coupled to a backbone network, the system comprising:

a broadband customer access network for coupling a plurality of end-users to the backbone network, wherein each end-user is associated with a particular one of the plurality of ISPs;

a first router coupled to the customer access network and in communication with the network for source-routing data packets output by at least one end-user to the ISP associated with the at least one end-user; and

a second router coupled to the backbone network and at least one of the plurality of ISPs for receiving the data packets source-routed by the first router and passing the data packets to the ISP associated with the at least one end user.

2. The system of claim 1, wherein the first router is an aggregation router coupled to the customer access network and the backbone network, the aggregation router for aggregating data packets received from a plurality of end-user systems on the customer access network onto the backbone network.

3. The system of claim 1, wherein the first router is the headend of a label switched path and the second router is the tailend of the label switched path.

4. The system of claim 3, wherein the first router pushes a label onto each data packet received from the at least one end-user and the second router pops a label off each data packet, further comprising:

at least one intermediate node coupled to the network between the first and second routers, the at least one intermediate node for receiving a data

packet from the first router, performing a label swap on the packet, and routing the data packet towards the second router.

5. The system of claim 1, wherein the broadband customer access network is a cable television network.

6. The system of claim 1, wherein the broadband customer access network is a telephone network.

7. In a network having a headend and a tailend, a method of sharing bandwidth on the network among one or more internet service providers (ISPs) coupled to the tailend, the network receiving data packets from end-users coupled to the headend and associated with particular ones of the one or more ISPs, the method comprising the steps of:

creating a forwarding equivalency class (FEC) for each of the one or more ISPs coupled to the tailend;

passing the label for each FEC to the headend;

storing a label for each FEC in an FEC table at the headend;

receiving, at the headend, a data packet from an end-user;

determining the ISP associated with the end-user; and

routing the data packet through the tailend to the ISP associated with the end-user using the label stored in the FEC table for the FEC of the ISP.

8. The method of claim 7, wherein the network comprises an intermediate node between the tailend and the headend and further comprising the steps of:

receiving, at the intermediate node, the label and FEC from the tailend;

building an intermediate FEC table at the intermediate node storing the label and the FEC received from the tailend;

storing an upstream label for the FEC in the intermediate FEC table; and

passing the upstream label and the FEC from the intermediate node to the headend.

9. The method of claim 7, wherein the determining step comprises the step of:

determining an autonomous system number (ASN) of the ISP associated with the end-user.

10. The method of claim 9, wherein the routing step comprises the step of:

looking up the ASN in the FEC table to determine the label.

11. The method of claim 7, wherein the step of storing the label for each FEC in the FEC table comprises the step of:

verifying that a better path for the FEC does not exist.

12. The method of claim 11, wherein the step of storing the label for each FEC in the FEC table further comprises the steps of:

arbitrating between similar FECs; and

arbitrating between similar labels.

13. The method of claim 11, wherein the step of storing the label for each FEC in the FEC table further comprises the step of:

selecting among multiple paths associated with an FEC using a path-choosing metric.

14. The method of claim 7, wherein the routing step comprises the step of:

pushing the label stored in the FEC table for the FEC for the ISP onto the data packet.

15. The method of claim 7, further comprising the step of:

accounting for an amount of data passed to the ISP associated with the end-user.

16. The method of claim 15, wherein the accounting step comprises the step of:

accounting for an amount of data passing through the tailend to each of the one or more ISPs coupled to the tailend.

17. The method of claim 15, wherein the accounting step comprises the step of:

accounting for an amount of data received at the headend destined for each of the one or more ISPs coupled to the tailend.

18. A system for sharing bandwidth on a customer access network, to which a plurality of end-users are coupled, among a plurality of internet service providers (ISPs), wherein each end-user is associated with a particular ISP, the system comprising:

a first node coupled to the customer access network and to a backbone network, the first node for receiving data packets from the plurality of end-users, for determining the ISP associated with each end-user, and for routing the data packets from each end-user to the ISP associated with the end-user; and

a second node coupled to the backbone network and to one or more of the ISPs, for receiving the data packets routed by the first node to the one or more ISPs coupled to the second node, and for passing the data packets to the associated ISPs.

19. The system of claim 18, wherein the first node is an aggregation router for aggregating the data packets from the end-users onto the backbone network.

20. The system of claim 18, wherein the first node uses multiprotocol label switching (MPLS) to route data packets to the ISP associated with the end-user.

21. The system of claim 20, wherein the first node uses MPLS over the Network layer of the Open Systems Interconnection network reference model.

22. The system of claim 20, wherein the first node associates a label with a data packet, wherein the label is determined responsive to the end-user providing the packet.

23. The system of claim 18, wherein the first node determines the ISP associated with an end-user by determining an autonomous system number (ASN) of an ISP associated with the end-user.

24. The system of claim 23, wherein the ASN is communicated from the end-user to the first node.

25. The system of claim 23, wherein the first node determines the ASN responsive to an incoming data interface to which the end-user is coupled.